HANDY TABLES

FOR

ELECTRICAL AND STEAM ENGINEERS

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INTRODUCTORY.

Tables of any kind are useful in arriving at approximate results without extensive calculation, but a user of tables should constantly bear in mind the fact that some results must be only approximate because it is not practicable to construct a table that will cover every possible case or contain all practical factor values. To illustrate—Table III is absolutely accurate as to the factor values given, but it will not serve to find the current taken by a motor of 83 per cent efficiency. This value can be *approximated* by taking a figure midway between the current at 82 and that at 84 per cent. Again, the table is not accurate, of course, for 115-volt and 230-volt motors; but it can be used as a guide without serious error.

Most of the tables contained in this pamphlet are constructed on the ordinary plan of giving three sets of interdependent factor values, so that by assuming any two the other one may be found. Table XII is made on a slightly different plan, and embraces four factors—cylinder diameter, horse-power, mean-effective pressure and stroke × r.p.m. The composite factor, stroke × r.p.m., corresponds in character, but not in value, to piston speed; it is employed because it is much less trouble to multiply the stroke by the revolutions than it is to calculate piston speed in feet per minute. The method of using the table is indicated in the footnotes.

REMOTE STORAGE

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Table I.

Copper Wires for Electric Light and Power Circuits.

Wire Sizes.	Pounds per 1000 ft. Bare wire.	Pounds per 1000 ft. Triple braid, w'p'f	Ohms per 1000 feet at different temperatures, Fahrenheit. 60°	75°	90°	110-volt constants.* For computing load or distance at 75° F. corresponding to different line losses.† 1%	1½%	2%	2½%	3%	Maximum current. Rubber covered.	Triple-braid w'p'f.	Wire Sizes.
500 M.	1515	...	0.0204	0.021	0.0271	24,900	37,350	49,800	62,250	74,700	...	...	500 M.
400 M.	1212	...	0.0254	0.0263	0.0339	20,800	31,200	41,600	52,000	62,400	...	...	400 M.
300 M.	909	...	0.034	0.0351	0.0452	15,600	23,400	31,200	39,000	46,800	...	...	300 M.
0000	641	740	0.0481	0.0497	0.0513	11,000	16,500	22,000	27,500	33,000	210	312	0000
000	509	600	0.0606	0.0626	0.0646	8,750	13,100	17,500	21,850	26,250	177	262	000
00	403	485	0.0764	0.0789	0.0815	7,000	10,500	14,000	17,500	21,000	150	220	00
0	320	395	0.0964	0.0996	0.1027	5,500	8,250	11,000	13,750	16,500	127	185	0
1	253	315	0.122	0.1256	0.1296	4,350	6,525	8,700	10,875	13,050	107	156	1
2	202	252	0.153	0.1584	0.1634	3,450	5,175	6,900	8,625	10,350	90	131	2
3	159	205	0.1942	0.1997	0.2061	2,750	4,125	5,500	6,875	8,250	76	110	3
4	126	170	0.2446	0.2518	0.2598	2,175	3,260	4,350	5,435	6,525	65	92	4
5	100	140	0.3075	0.3176	0.3278	1,730	2,600	3,460	4,330	5,200	54	77	5
6	79	115	0.388	0.4006	0.4132	1,360	2,040	2,720	3,400	4,080	46	65	6
7	63	95	0.492	0.5047	0.5208	1,000	1,500	2,000	2,500	3,000	..	..	7
8	50	75	0.6215	0.6364	0.6568	850	1,275	1,700	2,125	2,550	33	46	8
10	32	52	0.9785	1.012	1.0444	540	810	1,080	1,350	1,620	24	32	10
12	20	38	1.552	1.609	1.6608	340	510	680	850	1,020	17	23	12
14	12½	25	2.485	2.56	2.6412	215	320	430	535	645	12	16	14

*Divide the constants in the body of the table by the amperes to find the distance (twice the length of wire) or by the distance to find the current.
†The losses at heads of columns are percentages of the delivered e.m.f.

Table II.—Incandescent Lamp Current.

Showing the current in amperes required by groups of 16-c.p. incandescent lamps of the efficiencies and voltages most commonly used.

Lamps.	3.1 watt. 110 v.	3.1 watt. 115 v.	3½ watt. 110 v.	3½ watt. 115 v.
10	4.51	4.31	5.09	4.87
11	4.96	4.74	5.6	5.36
12	5.41	5.18	6.11	5.84
13	5.86	5.61	6.62	6.33
14	6.31	6.04	7.13	6.82
15	6.76	6.47	7.64	7.3
16	7.21	6.9	8.15	7.79
17	7.67	7.33	8.65	8.28
18	8.12	7.76	9.17	8.77
19	8.57	8.2	9.67	9.25
20	9.02	8.63	10.18	9.74
22	9.92	9.49	11.2	10.71
24	10.82	10.35	12.22	11.69
25	11.27	10.78	12.73	12.18
26	11.73	11.22	13.24	12.66
28	12.63	12.08	14.25	13.64
30	13.53	12.94	15.27	14.61
32	14.43	13.8	16.29	15.58
34	15.33	14.66	17.31	16.56
35	15.78	15.1	17.82	17.04
36	16.23	15.53	18.33	17.53
38	17.13	16.39	19.35	18.5
40	18.04	17.25	20.36	19.48
42	18.94	18.12	21.38	20.45
44	19.84	18.98	22.4	21.43
45	20.29	19.41	22.91	21.91
46	20.74	19.84	23.42	22.4
48	21.64	20.7	24.44	23.37
50	22.55	21.57	25.45	24.35
52	23.45	22.43	26.47	25.32
54	24.35	23.29	27.49	26.3
55	24.8	23.72	28.	26.78
56	25.25	24.15	28.51	27.27
58	26.15	25.02	29.53	28.25
60	27.06	25.88	30.55	29.22
62	27.96	26.74	31.56	30.19
64	28.86	27.6	32.58	31.17
65	29.31	28.04	33.09	31.65
66	29.76	28.47	33.6	32.14
68	30.66	29.33	34.62	33.11
70	31.57	30.19	35.64	34.09
72	32.47	31.05	36.66	35.06
74	33.37	31.92	37.67	36.04
75	33.82	32.35	38.18	36.52
76	34.27	32.78	38.69	37.01
78	35.17	33.64	39.71	37.98
80	36.07	34.51	40.73	38.96
82	36.98	35.37	41.75	39.93
84	37.88	36.23	42.77	40.91
85	38.33	36.66	43.28	41.39
86	38.78	37.09	43.78	41.88
88	39.68	37.96	44.8	42.85
90	40.58	38.82	45.82	43.83
92	41.49	39.68	46.84	44.8
94	42.39	40.55	47.86	45.78
95	42.84	40.98	48.37	46.26
96	43.29	41.41	48.87	46.75
98	44.19	42.27	49.89	47.73

The current required by groups of less than 10 lamps may be found by taking the current for ten times the actual number and dividing it by 10. Thus the current taken by 7 lamps of 3.1 watts efficiency and 110 volts is 3.157 amperes.

Table III.—Current Required by 110-Volt and 220-Volt Direct-Current Motors.

Efficiency,	110-Volt Motors.												
	¼ HP.	⅜ HP.	½ HP.	¾ HP.	1 HP.	1½ HP.	2 HP.	2½ HP.	3 HP.	4 HP.	5 HP.	7½ HP.	10 HP.
	220-Volt Motors.												
	½ HP.	¾ HP.	1 HP.	1½ HP.	2 HP.	3 HP.	4 HP.	5 HP.	6 HP.	7½ HP.	10 HP.	15 HP.	20 HP.
60	**2.83**	**4.24**	5.65	8.47	**11.3**	16.95	22.6	28.25	33.9	42.38	56.51	84.77	**113.**
62	2.73	4.1	**5.47**	**8.2**	10.94	16.41	21.87	27.35	32.81	41.02	54.69	82.04	**109.38**
64	2.65	3.97	**5.3**	**7.95**	**10.6**	**15.89**	21.19	26.49	31.79	39.73	52.98	79.47	105.95
66	2.57	3.85	5.14	7.7	**10.27**	15.41	20.55	25.69	30.83	38.53	51.38	77.07	102.75
68	2.49	3.74	4.98	7.48	9.97	**14.96**	**19.95**	**24.93**	29.92	37.40	49.87	74.8	99.73
70	2.42	3.63	4.84	7.27	9.69	14.53	**19.38**	24.22	**29.06**	36.33	48.44	72.66	96.88
72	2.35	3.53	4.71	7.06	9.42	14.13	18.84	23.55	28.26	35.32	47.1	70.64	94.19
74	2.29	3.44	4.58	6.87	9.16	13.75	18.33	**22.91**	27.49	34.37	45.82	68.73	91.64
75	2.26	3.39	4.52	6.78	9.04	13.56	18 08	22.61	**27.13**	33.91	**45.21**	67.82	90.42
76	2.23	3.35	4.46	6.69	8.92	13.38	17.85	22.31	26.77	**33.46**	44.62	66.92	89.23
78	2.17	3.26	4.35	6.52	8.69	13.04	17.39	21.74	26.08	32.60	43.47	**65.21**	86.95
80	2.12	3.18	4.24	6.36	8.48	12.72	16.95	21.19	25.43	31.79	42.39	63.58	84.77
82	....	3.1	4.13	6.2	8.27	12.41	16.54	20.68	24.81	31.02	**41.35**	62.03	82.70
84	....	3.03	4.04	6.05	8.07	12.11	16.15	20.18	24.22	30.27	40.37	60.55	**80.74**
85	....	2.99	3.99	5.98	7.98	11.97	15.96	19.95	23.94	29.92	39.89	**59.84**	79.73
86	....	....	3.94	5.91	7.88	11.83	15.77	19.72	23.66	29.57	39.43	59.14	78.86
88	....	....	3.85	5.78	**7.7**	11.56	15.41	19.27	23.12	28.9	38.53	57.8	**77.07**
90	....	....	3.77	5.65	7.53	11.30	15.07	18.84	22.6	28.26	37.68	56.56	75.35
91	....	....	....	....	....	11.18	14.9	18.63	22.36	27.95	37.26	55.89	74.52
92	....	....	....	....	....	11.06	14.74	18.43	22.11	27.64	36.86	55.29	73.72
93	....	....	....	....	....	10.94	14.58	18.23	21.88	27.35	36.46	54.69	72.92

The heavy figures indicate the current taken by motors of average efficiency. When there are two in one column, the upper figure refers to 110-volt motors and the lower one to 220-volt machines.

Table IV.—Current Required by 500-Volt Direct-Current Motors.

Efficiency.	1 HP.	1½ HP.	2 HP.	3 HP.	5 HP.	7½ HP	10 HP.	15 HP.	20 HP.	25 HP.	30 HP.
60	**2.49**	**3.73**	4.97	7.46	12.43	18.65	24.87	37.3	49.74	62.17	74.60
62	2.41	3.61	**4.81**	7.22	12.03	18.05	24.07	36.1	48.13	60.16	72.2
64	2.33	3.5	4.66	6.99	11.66	17.47	23.31	34.97	46.63	58.28	69.94
66	2.26	3.39	4.52	**6.77**	11.29	16.93	22.58	33.86	45.15	56.44	67.73
68	2.19	3.29	4.39	6.58	**10.97**	16.46	21.94	32.92	43.88	54.86	65.83
70	2.13	3.2	4.26	6.39	10.66	15.98	21.31	31.97	42.63	53.28	63.95
72	2.07	3.11	4.14	6.22	10.36	15.54	20.72	31.08	41.45	51.8	62.17
74	2.02	3.02	4.03	6.05	10.08	**15.12**	20.16	30.24	40.33	50.14	60.49
75	1.99	2.98	3.98	5.97	9.95	14.92	19.89	29.84	39.79	49.73	59.68
76	1.96	2.94	3.93	5.89	9.82	14.72	19.63	29.45	39.26	49.08	58.9
78	1.91	2.87	3.83	5.74	9.56	14.35	**19.13**	28.69	38.26	47.82	57.39
80	1.86	2.8	3.73	5.6	9.32	13.99	18.65	27.97	37.3	46.63	55.95
82	1.82	2.73	3.64	5.46	9.1	13.65	18.2	27.29	36.39	45.49	54.59
84	1.78	2.66	3.55	5.33	8.88	13.32	17.76	**26.64**	35.52	44.41	53.29
85	1.76	2.63	3.51	5.27	8.78	13.13	17.55	26.33	35.11	43.88	52.66
86	1.73	2.60	3.47	5.21	8.67	13.01	17.35	26.02	**34.7**	43.37	52.05
88	1.7	2.54	3.39	5.09	8.48	12.72	16.96	25.43	33.91	**42.39**	50.87
90	1.66	2.49	3.32	4.97	8.29	12.43	16.58	24.87	33.16	41.45	**49.74**
91	1.64	2.46	3.28	4.92	8.2	12.3	16.4	24.6	32.79	40.99	49.19
92	1.62	2.43	3.24	4.87	8.11	12.16	16.22	24.33	32.44	40.55	48.66
93	1.6	2.41	3.21	4.81	8.02	12.03	16.04	24.07	32.09	40.11	48.13

The heavy figures indicate current taken by motors of average efficiency.

Table V.—Single-Phase Motor Current.

Showing the current required by 100-volt single-phase alternating-current motors per horse-power of output.

A 200-volt motor requires one-half the current, and a 400-volt motor one-quarter the current given by the table.

A two-phase motor requires one-half the current per phase of a single-phase motor.

Efficiency.	POWER FACTOR OF THE MOTOR.											
	.78	.80	.82	.84	.85	.86	.87	.88	.89	.90	.91	.92
75%	12.75	12.43	12.13	11.84	11.70	11.57	11.43	11.30	11.18	11.05	10.93	10.81
76%	12.57	12.26	11.96	11.68	11.54	11.40	11.27	11.14	11.02	10.90	10.78	10.66
77%	12.41	12.10	11.80	11.52	11.38	11.25	11.12	11.	10.87	10.75	10.53	10.52
78%	12.25	11.95	11.66	11.38	11.24	11.11	10.99	10.86	10.74	10.62	10.50	10.39
79%	12.10	11.80	11.51	11.24	11.11	10.98	10.85	10.73	10.61	10.49	10.38	10.26
80%	11.95	11.65	11.36	11.09	10.96	10.83	10.71	10.59	10.47	10.35	10.24	10.13
81%	11.80	11.51	11.23	10.96	10.83	10.71	10.58	10.46	10.34	10.23	10.12	10.01
82%	11.66	11.37	11.09	10.83	10.70	10.58	10.46	10.34	10.22	10.11	10.	9.89
83%	11.51	11.22	10.95	10.69	10.56	10.44	10.32	10.20	10.09	9.97	9.87	9.76
84%	11.38	11.10	10.83	10.57	10.44	10.32	10.20	10.09	9.97	9.86	9.76	9.65
85%	11.24	10.96	10.69	10.44	10.31	10.19	10.08	9.96	9.85	9.74	9.63	9.55
86%	11.11	10.83	10.57	10.33	10.20	10.08	9.96	9.85	9.74	9.63	9.52	9.42
87%	10.98	10.71	10.45	10.20	10.08	9.96	9.85	9.74	9.63	9.52	9.41	9.31
88%	10.87	10.60	10.34	10.09	9.97	9.85	9.74	9.63	9.53	9.42	9.32	9.21
89%	10.74	10.47	10.22	9.97	9.86	9.74	9.63	9.52	9.41	9.31	9.21	9.11
90%	10.63	10.36	10.11	9.87	9.75	9.64	9.53	9.42	9.31	9.21	9.11	9.01
91%	10.51	10.25	10.	9.76	9.64	9.53	9.42	9.32	9.21	9.11	9.01	8.91
92%	10.39	10.13	9.89	9.65	9.54	9.43	9.32	9.21	9.11	9.01	8.91	8.81

Table VI.—Three-Phase Motor Current.

Showing the current per phase required by 100-volt three-phase motors per horse-power of output.

A 200-volt motor requires one-half the current, and a 400-volt motor one-quarter the current given by the table.

Efficiency.	POWER FACTOR OF THE MOTOR.											
	.78	.80	.82	.84	.85	.86	.87	.88	.89	.90	.91	.92
75%	7.36	7.18	7.	6.84	6.76	6.68	6.	6.52	6.45	6.38	6.31	6.24
76%	7.26	7.08	6.91	6.74	6.66	6.58	6.51	6.43	6.36	6.29	6.22	6.15
77%	7.16	6.99	6.81	6.65	6.57	6.5	6.42	6.35	6.28	6.21	6.14	6.07
78%	7.07	6.9	6.73	6.57	6.49	6.41	6.35	6.27	6.2	6.13	6.06	6.
79%	6.99	6.81	6.65	6.49	6.41	6.34	6.26	6.19	6.13	6.06	5.99	5.92
80%	6.9	6.73	6.56	6.4	6.33	6.25	6.18	6.11	6.04	5.98	5.91	5.85
81%	6.81	6.65	6.48	6.33	6.25	6.18	6.11	6.04	5.97	5.91	5.84	5.78
82%	6.73	6.57	6.4	6.25	6.18	6.11	6.04	5.97	5.9	5.84	5.77	5.71
83%	6.65	6.48	6.32	6.17	6.1	6.03	5.96	5.89	5.83	5.76	5.7	5.64
84%	6.57	6.41	6.25	6.1	6.03	5.96	5.89	5.83	5.76	5.69	5.63	5.57
85%	6.49	6.33	6.17	6.03	5.95	5.88	5.82	5.75	5.69	5.62	5.56	5.5
86%	6.41	6.25	6.1	5.96	5.89	5.82	5.75	5.69	5.62	5.56	5.5	5.44
87%	6.34	6.18	6.03	5.89	5.82	5.75	5.69	5.62	5.56	5.5	5.43	5.38
88%	6.28	6.12	5.97	5.83	5.76	5.69	5.62	5.56	5.5	5.44	5.38	5.32
89%	6.2	6.04	5.9	5.76	5.69	5.62	5.56	5.5	5.43	5.38	5.32	5.26
90%	6.14	5.98	5.84	5.7	5.63	5.57	5.5	5.44	5.38	5.32	5.26	5.2
91%	6.07	5.92	5.77	5.63	5.57	5.5	5.44	5.38	5.32	5.26	5.2	5.14
92%	6.	5.85	5.71	5.57	5.51	5.44	5.38	5.32	5.26	5.2	5.14	5.09

Table VII.—Electrical Horse-Power.

Figures in body of table are Amperes required to give the Horse-power in the side columns, at Voltage at top of columns.

HP.	Amperes in body of table. Volts at column heads. 110	115	220	230	500	HP.	Amperes in body of table. Volts at Column heads. 110	115	220	230	500
¼	1.679	1.621	.8396	.8105	.373	48	322.4	311.3	161.2	155.65	71.62
½	3.358	3.243	1.6792	1.6215	.746	49	329.1	317.8	164.55	158.9	73.11
¾	5.038	4.864	2.5189	2.432	1.119	50	335.85	324.3	167.925	162.15	74.6
1	6.717	6.486	3.3585	3.243	1.492	51	342.55	330.76	171.275	165.38	76.09
2	13.435	12.972	6.7175	6.485	2.984	52	349.3	337.25	174.65	168.625	77.58
3	20.15	19.458	10.075	9.729	4.476	53	356.	343.75	178.	171.875	79.08
4	26.87	25.944	13.435	12.972	5.968	54	362.7	350.2	181.35	175.1	80.57
5	33.585	32.429	16.7925	16.2145	7.609	55	369.4	356.7	184.7	178.35	82.06
6	40.3	38.914	20.15	19.457	8.952	56	376.15	363.2	188.075	181.6	83.55
7	47.02	45.402	23.51	22.701	10.444	57	382.85	369.7	191.425	184.85	85.04
8	53.74	51.888	26.87	25.944	11.94	58	389.6	376.2	194.8	188.1	86.54
9	60.45	58.72	30.225	29.36	13.43	59	396.3	382.66	198.15	191.33	88.03
10	67.17	64.861	33.585	32.431	14.92	60	403.	389.15	201.5	194.575	89.52
11	73.89	71.35	36.945	35.675	16.412	61	409.75	395.64	204.875	197.82	91.01
12	80.6	77.83	40.3	38.915	17.904	62	416.45	402.1	208.225	201.05	92.5
13	87.32	84.32	43.66	42.16	19.396	63	423.15	408.6	211.575	204.3	93.99
14	94.04	90.805	47.02	45.4025	20.887	64	429.9	415.1	214.95	207.55	95.49
15	101.75	97.29	50.875	48.645	22.38	65	436.6	421.56	218.3	210.78	96.98
16	107.46	103.76	53.73	51.88	23.872	66	443.3	428.08	221.65	214.04	98.47
17	114.18	110.25	57.09	55.125	25.364	67	450.	434.55	225.	217.275	99.96
18	120.91	116.75	60.455	58.375	26.356	68	456.75	441.	228.375	220.5	101.45
19	127.62	123.23	63.81	61.615	28.348	69	463.5	447.5	231.75	223.75	102.95
20	134.35	129.72	67.175	64.86	29.84	70	470.2	454.	235.1	227.	104.44
21	141.05	136.21	70.525	68.105	31.342	71	476.9	460.5	238.45	230.25	105.93
22	147.76	142.7	73.88	71.35	32.824	72	483.6	467.	241.8	233.5	107.42
23	154.49	149.18	77.245	74.59	34.317	73	490.3	473.46	245.15	236.7	108.9
24	161.2	155.66	80.6	77.83	35.808	74	497.05	479.95	248.525	239.975	110.4
25	167.93	162.15	83.965	81.075	37.3	75	503.8	486.45	251.9	243.225	111.9
26	174.64	168.64	87.32	84.32	38.793	76	510.5	492.9	255.25	246.45	113.4
27	181.35	175.12	90.675	87.56	40.284	77	517.2	499.4	258.6	249.7	114.9
28	188.07	181.61	94.035	90.805	41.775	78	523.9	505.9	261.95	252.95	116.4
29	194.8	188.1	97.4	94.05	43.27	79	530.6	512.2	265.3	256.1	117.9
30	201.5	194.58	100.75	97.29	44.76	80	537.4	518.9	268.7	259.45	119.4
31	208.22	201.05	104.11	100.525	46.25	81	544.1	525.4	272.05	262.7	120.85
32	214.95	207.55	107.475	103.775	47.745	82	550.8	531.8	275.4	265.9	122.35
33	221.66	214.04	110.83	107.02	49.238	83	555.5	538.4	277.75	269.2	123.84
34	228.38	220.52	114.19	110.26	50.73	84	564.2	544.8	282.1	272.4	125.33
35	235.1	227.	117.55	113.5	52.22	85	571.	551.3	285.5	275.65	126.8
36	241.8	233.5	120.9	116.75	53.71	86	577.7	557.8	288.85	278.9	128.3
37	248.5	239.97	124.25	119.985	55.205	87	584.4	564.3	292.2	282.15	129.8
38	255.25	246.45	127.625	123.275	56.698	88	591.1	570.8	295.55	285.4	131.3
39	261.95	252.95	130.975	126.475	58.19	89	597.8	577.2	298.9	288.6	132.8
40	268.68	259.43	134.34	129.715	59.68	90	604.5	583.7	302.25	291.85	134.3
41	275.4	265.9	137.7	132.95	61.17	91	611.2	590.2	305.6	295.1	135.8
42	282.1	272.4	141.05	136.2	62.66	92	618.	596.7	309.	298.35	137.25
43	288.8	278.9	144.4	139.45	64.16	93	624.7	603.2	312.35	301.6	138.75
44	295.55	285.37	147.775	142.685	65.65	94	631.4	609.7	315.7	304.85	140.25
45	302.25	291.85	151.125	145.925	67.14	96	644.8	622.6	322.4	311.3	143.2
46	308.97	298.35	154.485	149.175	68.63	98	658.3	635.6	329.15	317.8	146.2
47	315.7	304.83	157.85	152.415	70.12	100	671.7	648.6	335.85	324.3	149.2

Example: Current required at 230 volts to transmit 75 horse-power. In column under 230, opposite 75 in the Horse-power columns, is found the number 243.225, which is the required number of amperes.

Table VIII.—Magnet Wires for Electromagnets, Field Coils, etc. Electrical Properties.

Sizes, B. & S.	Resistance per 1000 feet at Various Temperatures. 100° F.	120° F.	140° F.	150° F.	160° F	Current required to give the Amperes per square inch at top of columns. 1000	1100	1200	1300	1400	1500	1600	1700	1800	Sizes, B. & S.
4	.2659	.2766	.2875	.2935	.2995	32.78	36.06	39.34	42.62	45.9	49.18	52.45	55.73	59.01	4
5	.3353	.3488	.3625	.3701	.3776	26.	28.6	31.2	33.8	36.4	39.	41.6	44.2	46.8	5
6	.4229	.4398	.4571	.4667	.4762	20.62	22.68	24.74	26.80	28.86	30.92	32.99	35.05	37.11	6
7	.5332	.5546	.5764	.588	.6005	16.35	17.98	19.62	21.25	22.89	24.52	26.16	27.8	29.43	7
8	.6724	.6993	.7268	.742	.7572	12.97	14.26	15.56	16.86	18.15	19.45	20.75	22.04	23.34	8
9	.8477	.8816	.9164	.9355	.9546	10.28	11.31	12.34	13.37	14.4	15.43	16.45	17.48	18.51	9
10	1.0693	1.1122	1.156	1.18	1.2041	8.15	8.97	9.78	10.6	11.41	12.23	13.05	13.86	14.67	10
11	1.3481	1.402	1.4574	1.4877	1.5181	6.47	7.11	7.76	8.41	9.05	9.7	10.35	10.99	11.64	11
12	1.7	1.768	1.8378	1.876	1.9143	5.13	5.64	6.15	6.67	7.18	7.69	8.21	8.72	9.23	12
13	2.1436	2.2295	2.3173	2.3655	2.414	4.07	4.47	4.88	5.29	5.69	6.10	6.51	6.91	7.32	13
14	2.703	2.811	2.922	2.983	3.044	3.15	3.46	3.78	4.09	4.41	4.72	5.03	5.35	5.66	14
15	3.4085	3.531	3.685	3.7615	3.838	2.56	2.81	3.07	3.33	3.58	3.84	4.09	4.35	4.60	15
16	4.286	4.458	4.633	4.73	4.8265	2.03	2.23	2.43	2.64	2.84	3.04	3.25	3.45	3.65	16
17	5.4195	5.6365	5.859	5.981	6.103	1.61	1.77	1.93	2.09	2.25	2.41	2.57	2.73	2.9	17
18	6.834	7.108	7.388	7.542	7.698	1.28	1.4	1.53	1.66	1.79	1.91	2.04	2.17	2.3	18
19	8.863	9.218	9.581	9.781	9.981	.984	1.082	1.18	1.279	1.377	1.475	1.574	1.672	1.771	19
20	10.866	11.32	11.748	11.992	12.237	.802	.882	.962	1.043	1.143	1.203	1.284	1.364	1.444	20
21	13.72	14.251	14.812	15.121	15.43	.636	.7	.763	.827	.891	.954	1.018	1.082	1.145	21
22	17.272	17.963	18.671	19.06	19.45	.505	.555	.606	.656	.707	.757	.808	.858	.908	22
23	21.79	22.661	23.555	24.045	24.536	.4	.44	.48	.52	.56	.6	.64	.68	.72	23
24	27.475	28.575	29.701	30.32	30.94	.317	.349	.381	.412	.444	.476	.508	.539	.571	24
25	34.645	36.031	37.451	38.232	39.013	.252	.277	.302	.327	.352	.377	.403	.428	.453	25
26	43.7	45.45	47.242	48.226	49.211	.199	.219	.239	.259	.279	.299	.319	.339	.359	26

Table IX.—Magnet Wires for Electromagnets, Field Coils, etc. Mechanical Data.

The letters S. C. C., D. C. C. and T. C. C. mean single-cotton-covered, double-cotton-covered and triple-cotton-covered.

B. & S. Gauge Number.	Pounds per 1000 feet. S. C. C.	D. C. C.	T. C. C.	Diameter over Insulation. S. C. C.	D. C. C.	T. C. C.	Number of turns per linear inch. S. C. C.	D. C. C.	T. C. C.	Layers per inch of coil depth. S. C. C.	D. C. C.	T. C. C.	Proportion of actual copper in coil cross-section. S. C. C.	D. C. C.	T. C. C.	Gauge No.
4	128.	128.38	128.75	.216	.222	.228	4.63	4.5	4.38	4.63	4.51	4.39	.70	.66	.63	4
5	101.65	102.02	102.39	.194	.200	.206	5.15	5.	4.85	5.15	5.01	4.86	.69	.65	.61	5
6	80.7	81.07	81.44	.172	.177	.182	5.81	5.65	5.49	5.82	5.66	5.5	.70	.66	.62	6
7	64.06	64.43	64.8	.154	.159	.164	6.49	6.29	6.1	6.5	6.3	6.11	.69	.65	.61	7
8	50.82	51.18	51.54	.138	.143	.148	7.25	7.	6.76	7.26	7.01	6.77	.68	.63	.59	8
9	40.32	40.65	40.97	.123	.127	.131	8.13	7.87	7.64	8.14	7.88	7.66	.69	.64	.60	9
10	32.	32.30	32.62	.109	.113	.116	9.18	8.85	8.62	9.2	8.87	8.65	.69	.64	.60	10
11	25.4	25.70	26.	.097	.100	.103	10.31	10.	9.7	10.33	10.03	9.74	.68	.63	.59	11
12	20.2	20.50	20.8	.087	.091	.095	11.49	10.99	10.53	11.52	11.02	10.57	.67	.62	.58	12
13	16.04	16.36	16.57	.078	.081	.085	12.82	12.35	11.77	12.85	12.39	11.82	.78	.63	.59	13
14	12.75	13.	13.25	.070	.073	.076	14.28	13.7	13.16	14.3	13.74	13.21	.66	.61	.56	14
15	10.13	10.33	10.52	.063	.066	.069	15.87	15.15	14.49	15.9	15.2	14.55	.64	.59	.54	15
16	8.05	8.2	8.37	.057	.060	.063	17.54	16.66	15.87	17.57	16.71	15.93	.63	.57	.52	16
17	6.4	6.55	6.7	.051	.054	.057	19.61	18.52	17.55	19.67	18.6	17.65	.62	.55	.50	17
18	5.09	5.23	5.37	.046	.049	.052	21.74	20.41	19.23	21.81	20.5	19.35	.60	.53	.47	18
19	3.93	4.07	4.2	.042	.045	.048	23.81	22.22	20.83	23.88	22.32	20.96	.56	.48	.42	19
20	3.216	3.33	3.45	.0375	.0405	.043	26.67	24.69	23.26	26.75	24.8	23.4	.57	.49	.43	20
21	2.562	2.68	2.8	.034	.037	.04	29.41	27.03	25.	29.5	27.15	25.15	.55	.46	.40	21
22	2.04	2.15	2.27	.031	.034	.037	32.26	29.41	27.	32.39	29.58	27.22	.53	.44	.37	22
23	1.628	1.72	1.83	.0275	.0305	.033	36.36	32.79	30.3	36.56	32.99	30.54	.52	.43	.36	23
24	1.303	1.38	1.47	.025	.0275	.03	40.	36.36	33.33	40.16	36.58	33.57	.51	.42	.35	24
25	1.045	1.12	....	.023	.0255	....	43.48	39.22	....	43.66	39.46	....	.48	.39	...	25
26	.833	.91	....	.021	.0235	....	47.62	42.55	....	47.81	42.81	....	.45	.36	...	26

Table X.—Magnet Coils.

Giving the mean length per turn, corresponding to a given number of Ampere-turns, at a constant e.m.f. of 1 volt and a temperature of 150 degrees Fahrenheit. For other voltages multiply the constant in the table by the voltage at the coil terminals. For other temperatures multiply the result by the constant in the auxiliary table.

Ampere Turns.	Wire Sizes; B. and S. Gauge.										
	26	25	24	23	22	21	20	19	18	17	16
1000	.2488	.3139	.3958	.5201	.6296	.7936	1.0006	1.2269	1.5912	2.0065	2.537
1100	.2262	.2853	.3598	.4537	.5724	.7215	.9097	1.1153	1.4465	1.824	2.3065
1200	.2074	.2616	.3298	.4159	.5247	.6614	.8339	1.0224	1.326	1.672	2.1144
1300	.1914	.2414	.3044	.3839	.4843	.6104	.7697	.9438	1.224	1.5435	1.9516
1400	.1777	.2242	.2827	.3565	.4497	.5668	.7148	.8764	1.1365	1.4332	1.8122
1500	.1659	.2092	.2638	.3327	.4197	.529	.6671	.8179	1.0607	1.3375	1.6913
1600	.1555	.1962	.2473	.3119	.3935	.4959	.6254	.7668	.9944	1.254	1.5856
1700	.1464	.1846	.2328	.2936	.3703	.4668	.5886	.7217	.936	1.1803	1.4924
1800	.1382	.1744	.2199	.2773	.3497	.4408	.5559	.6816	.8839	1.1146	1.4095
1900	.131	.1652	.2083	.2627	.3314	.4176	.5266	.6458	.8374	1.056	1.3353
2000	.1244	.1569	.1979	.2495	.3148	.3968	.5003	.6134	.7956	1.003	1.2685
2100	.1185	.14945	.1885	.2376	.2998	.3779	.4765	.5842	.7577	.9544	1.208
2200	.1131	.14266	.1799	.2268	.2862	.3607	.4548	.5577	.7232	.912	1.1533
2300	.1082	.13646	.1721	.217	.2737	.345	.4351	.5334	.6918	.8723	1.103
2400	.1037	.13078	.1649	.2079	.2623	.3306	.4169	.5112	.663	.836	1.057
2500	.0945	.12554	.1583	.1996	.2518	.3174	.4002	.4907	.6364	.8025	1.0148
2600	.0957	.12072	.1522	.192	.2421	.3052	.3848	.4718	.612	.7717	.9758
2700	.0922	.11625	.1466	.1848	.2332	.2939	.3706	.4544	.5893	.7431	.9397
2800	.0889	.1121	.1413	.1782	.2248	.2834	.3573	.4382	.5682	.7166	.9061
2900	.0858	.10823	.1365	.1721	.2171	.2736	.345	.4231	.5486	.6918	.8748
3000	.0829	.10462	.1319	.1664	.2098	.2645	.3335	.409	.5304	.6688	.8456
3100	.0803	.10125	.1277	.161	.2031	.256	.3228	.3958	.5133	.6472	.8184
3200	.0777	.09808	.1237	.156	.1967	.248	.3127	.3834	.4972	.627	.7928
3300	.0754	.09511	.11993	.1512	.1908	.2404	.3032	.3718	.4822	.608	.7688
3400	.07319	.09232	.1164	.1468	.1852	.2334	.2943	.3609	.468	.5901	.7462
3500	.07109	.08968	.11307	.1426	.1799	.2267	.2859	.3505	.4546	.5733	.7249
3600	.06912	.08719	.10994	.1386	.1749	.2204	.2779	.3408	.442	.5573	.7047
3700	.06725	.08483	.10696	.1349	.1702	.2145	.2704	.3316	.43	.5423	.6857
3800	.06548	.0826	.10415	.1313	.1657	.2088	.2633	.3229	.4187	.528	.6677
3900	.0638	.08048	.10148	.128	.1614	.2035	.2566	.3146	.408	.5145	.6505
4000	.0622	.0784	.09894	.1248	.1574	.1984	.2501	.3067	.3978	.5016	.6343
4100	.0607	.07655	.09653	.1217	.1535	.1935	.2441	.2992	.3881	.4894	.6188
4200	.0592	.07473	.09422	.1188	.1499	.1889	.2382	.2921	.3788	.4777	.6041
4300	.0578	.073	.09203	.116	.1464	.1845	.2327	.2853	.37	.4666	.59
4000	.0622	.07846	.09894	.1248	.1574	.1803	.2274	.2788	.3616	.456	.5766
4500	.0553	.0697	.08794	.1109	.1399	.1763	.2223	.2726	.3536	.4458	.5638
4600	.0541	.0682	.08604	.1085	.1368	.1725	.2175	.2667	.3459	.4362	.5516
4700	.0529	.06677	.0842	.1062	.1339	.1688	.2129	.261	.3385	.4269	.5398
4800	.0518	.06539	.08245	.104	.1312	.1653	.2085	.2556	.3315	.418	.5286
4900	.0508	.06405	.08077	.1018	.1285	.1619	.2042	.2504	.3247	.4095	.5178
5000	.0497	.06277	.07915	.0998	.1259	.1587	.2001	.2454	.3182	.4013	.5074
5200	.0478	.06036	.07611	.096	.1211	.1526	.1924	.2359	.306	.3858	.4879
5400	.0461	.05812	.07329	.0924	.1166	.1469	.1853	.2272	.2946	.3715	.4698
5600	.0444	.05604	.07067	.0891	.1124	.1417	.1787	.2191	.2842	.3583	.453
5800	.0429	.05412	.06823	.086	.1085	.1368	.1725	.2115	.2743	.3459	.4374
6000	.0415	.05231	.06596	.0832	.1049	.1322	.1668	.2045	.2652	.3344	.4228
6200	.0401	.05062	.06383	.0805	.1015	.128	.1614	.1979	.2566	.3236	.4092
6400	.0389	.04904	.06184	.078	.0983	.124	.1563	.1917	.2486	.3135	.3964
6600	.0377	.04755	.05996	.0756	.0954	.1202	.1516	.1859	.2411	.304	.3844
6800	.0366	.04615	.0582	.0734	.0926	.1167	.1471	.1804	.234	.295	.3731
7000	.0355	.04483	.05656	.0713	.0899	.1133	.1429	.1752	.2273	.2866	.3624

Table XI.—Magnet Cores.

Correction for loss of cross-sectional area due to rounding the corners of rectangular cores. Calculate the sectional area as though the corners were left sharp, and deduct the amount given in the table; the remainder will be the correct area of the cross-section.

Radius of arc at the corners	¼	⅜	½	¾	1	1¼	1½	1¾	2	2½	3
Deduct	.0537	.12	.215	.483	.858	1.34	1.93	2.63	3.434	5.375	7.75

Example: A magnet core 4 x 5 inches has corners rounded to a radius of ¾ inch. The area with sharp corners would be $4 \times 5 = 20$ sq. ins. Deduct 0.483; correct area = 19.52 sq. ins.

Table X.—Magnet Coils.—Continued.

Ampere Turns.	Wire Sizes; B. & S. Gauge.											
	15	14	13	12	11	10	9	8	7	6	5	4
3000	1.0634	1.341	1.691	2.132	2.688	3.389	4.272	5.39	6.797	8.571	10.81	13.63
3100	1.029	1.2977	1.636	2.063	2.602	3.28	4.134	5.217	6.578	8.295	10.46	13.19
3200	.997	1.2572	1.585	1.999	2.52	3.178	4.005	5.054	6.372	8.036	10.133	12.778
3300	.9667	1.219	1.537	1.938	2.444	3.081	3.884	4.9	6.18	7,792	9.826	12.39
3400	.9383	1.1833	1.449	1.8275	2.372	2.991	3.77	4.756	5.998	7.563	9.537	12.026
3500	.9115	1.1494	1.449	1.8275	2.304	2.905	3.662	4.62	5.826	7.347	9.264	11.682
3600	.8862	1.1174	1.409	1.7767	2.24	2.825	3.56	4.492	5.664	7.143	9.007	11.358
3700	.8622	1.0873	1.371	1.7288	2.18	2.748	3.464	4.371	5.511	6.95	8.764	11.051
3800	.8396	1.0586	1.335	1.6832	2.122	2.676	3.373	4.256	5.366	6.767	8.533	10.76
3900	.818	1.0315	1.3006	1.642	2.068	2.607	3.286	4.146	5.229	6.594	8.315	10.484
4000	.7976	1.0056	1.2682	1.559	2.016	2.542	3.204	4.043	5.098	6.429	8.107	10.223
4100	.7781	.9812	1.2372	1.561	1.967	2.48	3.126	3.944	4.974	6.272	7.909	9.973
4200	.7596	.9578	1.207	1.523	1.92	2.421	3.052	3.85	4.855	6.123	7.721	9.736
4300	.742	.9356	1.1797	1.4875	1.876	2.365	2.98	3.761	4.742	5.98	7.541	9.509
4400	.7251	.9143	1.1528	1.4537	1.833	2.311	2.913	3.675	4.634	5.844	7.369	9.293
4500	.709	.894	1.1273	1.4214	1.792	2.26	2.848	3.594	4.531	5.714	7.206	9.087
4600	.6935	.8745	1.1027	1.3905	1.753	2.21	2.786	3.515	4.433	5.39	7.049	8.889
4700	.6788	.8559	1.0793	1.361	1.716	2.163	2.727	3.441	4.339	5.471	6.899	8.7
4800	.6646	.8381	1.0568	1.3326	1.68	2.118	2.67	3.369	4.248	5.357	6.756	8.519
4900	.6511	.821	1.0353	1.3054	1.646	2.075	2.615	3.3	4.161	5.248	6.617	8.345
5000	.6381	.8046	1.0145	1.2793	1.613	2.034	2.563	3.234	4.078	5.143	6.485	8.178
5200	.6135	.7736	.9755	1.231	1.551	1.955	2.465	3.11	3.921	4.945	6.236	7.863
5400	.5908	.745	.9394	1.1845	1.494	1.883	2.373	2.995	3.776	4.762	6.005	7.572
5600	.5697	.7184	.9058	1.1423	1.44	1.816	2.289	2.888	3.641	4.592	5.79	7.302
5800	.55	.6936	.8746	1.1028	1.39	1.753	2.21	2.788	3.516	4.433	5.5591	7.05
6000	.5317	.6705	.8454	1.0661	1.344	1.695	2.136	2.695	3.398	4.286	5.404	6.815
6250	.5104	.6437	.8116	1.0234	1.29	1.627	2.051	2.587	3.263	4.114	5.188	6.542
6500	.4908	.6189	.7804	.9841	1.241	1.564	1.972	2.488	3.137	3.956	4.989	6.291
6750	.4726	.596	.7515	.9477	1.195	1.506	1.899	2.396	3.021	3.81	4.804	6.058
7000	.4557	.5747	.7247	.9138	1.152	1.453	1.831	2.31	2.913	3.673	4.632	5.841
7250	.44	.5549	.6997	.8823	1.112	1.402	1.768	2.23	2.813	3.547	4.473	5.64
7500	.4254	.5364	.6764	.8529	1.075	1.356	1.709	2.156	2.719	3.428	4.323	5.452
7750	.4116	.5191	.6546	.8253	1.041	1.312	1.654	2.086	2.631	3.318	4.184	5.276
8000	.3988	.5029	.6341	.7996	1.008	1.271	1.602	2.021	2.549	3.214	4.053	5.111
8250	.3867	.49	.6149	.7753	.9776	1.232	1.553	1.96	2.471	3.117	3.93	4.956
8500	.3753	.4733	.5968	.7525	.949	1.196	1.508	1.902	2.399	3.025	3.815	4.811
8750	.3646	.4598	.5798	.731	.9218	1.162	1.465	1.848	2.33	2.939	3.706	4.673
9000	.3545	.447	.5636	.7107	.8962	1.13	1.424	1.797	2.266	2.857	3.603	4.543
9250	.3449	.4349	.5484	.6915	.872	1.099	1.391	1.748	2.204	2.78	3.505	4.42
9500	.3369	.4234	.534	.6733	.849	1.07	1.349	1.702	2.146	2.707	3.413	4.304
9750	.3272	.4126	.5203	.656	.8273	1.043	1.314	1.658	2.091	2.637	3.326	4.194
10000	.319	.4023	.5073	.6396	.8066	1.017	1.282	1.617	2.039	2.571	3.243	4.089

Correction Table for Other Temperatures.

Temperature	100°	120°	140°	160°
Multiplier	.906	.943	.98	1.02

Example: A magnet requires 3200 ampere-turns; the mean length per turn may be from 19 to 20 inches; the voltage is 50. To reduce to mean length of the coil to mean length per volt, divide by 50; result, .38 to .4. In the table, opposite 3200 ampere-turns, the nearest number is .3834, and this is in No. 18 column. The wire will be No. 18, therefore, and the corrected mean length $.3834 \times 50 = 19.17$ inches.

Example II.—Conditions as above, but desired temperature 100° F. instead of 150°. The mean length obtained above was 19.17 inches; multiply this by .906; result, 17.37 inches. But it was desired to have between 19 and 20 inches; to find nearest table number, divide 19 or 20—say 19½—by the multiplier, .906. $19.5 \div .906 = 21.52$ inches; divide by 50 volts for ampere-turns per volt $= .4304$. The nearest numbers opposite 3200 are .3834 and .4972; the former was tried first and found too small. $50 \times .4972 = 24.43$ inches, so that the choice must lie between this and 17.37 inches first obtained.

Table XII-A.—Steam Engine Capacity.

Diam.	Horse Power Developed.											
3	1.6	1.74	1.87	2.01	2.14	2.27	2.41	2.54	2.67	2.81	2.94	3.08
3¼	1.88	2.04	2.2	2.35	2.51	2.67	2.83	2.98	3.14	3.3	3.45	3.61
3½	2.19	2.37	2.55	2.73	2.91	3.1	3.28	3.46	3.63	3.83	4.01	4.19
3¾	2.51	2.74	2.93	3.14	3.34	3.55	3.76	3.97	4.18	4.39	4.6	4.81
4	2.85	3.09	3.33	3.57	3.81	4.04	4.28	4.52	4.76	4.97	5.24	5.47
4¼	3.22	3.49	3.76	4.03	4.3	4.57	4.84	5.1	5.37	5.64	5.91	6.18
4½	3.61	3.91	4.22	4.52	4.82	5.12	5.42	5.72	6.02	6.32	6.63	6.93
4¾	4.03	4.36	4.7	5.03	5.37	5.7	6.04	6.38	6.71	7.05	7.38	7.72
5	4.46	4.83	5.2	5.58	5.95	6.32	6.69	7.06	7.44	7.81	8.18	8.55
5½	5.4	5.85	6.3	6.75	7.2	7.65	8.1	8.55	9.	9.45	9.9	10.35
6	6.42	6.96	7.49	8.03	8.56	9.1	9.64	10.17	10.71	11.24	11.78	12.31
6½	7.54	8.17	8.8	9.42	10.05	10.68	11.31	11.94	12.57	13.2	13.82	14.45
7	8.75	9.48	10.21	10.94	11.66	12.39	13.12	13.85	14.58	15.31	16.04	16.77
7½	10.04	10.88	11.71	12.55	13.38	14.22	15.06	15.9	16.73	17.57	18.4	19.24
8	11.42	12.38	13.33	14.28	15.23	16.18	17.14	18.09	19.04	19.99	20.95	21.9
8½	12.9	13.97	15.05	16.12	17.2	18.27	19.35	20.42	21.5	22.57	23.65	24.72
9	14.46	15.66	16.87	18.07	19.28	20.48	21.69	22.89	24.1	25.3	26.51	27.71
9½	16.11	17.45	18.79	20.14	21.48	22.82	24.16	25.51	26.85	28.19	29.53	30.88
10	17.85	19.34	20.82	22.31	23.8	25.29	26.76	28.26	29.75	31.24	32.72	34.21
11	21.6	23.4	25.2	27.	28.8	30.6	32.4	34.2	36.	37.8	39.6	41.4
12	25.7	27.85	29.99	32.13	34.27	36.42	38.56	40.7	42.84	44.98	47.13	49.27
13	30.16	32.68	35.19	37.71	40.22	42.73	45.25	47.76	50.28	52.79	55.3	57.82
14	35.	37.91	40.83	43.75	46.67	49.58	52.5	55.42	58.33	61.25	64.17	67.08
15	40.16	43.51	46.86	50.2	53.55	56.9	60.24	63.59	66.94	70.29	73.63	76.98
16	45.69	49.5	53.31	57.12	60.92	64.74	68.54	72.35	76.16	79.97	83.77	87.58
18	57.83	62.65	67.48	72.29	77.11	81.93	86.75	91.57	96.29	101.2	106.	110.8
20	71.4	77.35	83.3	89.25	95.2	101.1	107.1	113.	119.	125.	130.9	136.8

M. E. P.	Stroke in inches, multiplied by Revolutions per minute.											
25	1800	1950	2100	2250	2400	2550	2700	2850	3000	3150	3300	3450
26	1731	1875	2019	2164	2308	2452	2596	2740	2885	3029	3173	3317
27	1667	1806	1945	2083	2222	2361	2500	2639	2778	2917	3056	3195
28	1607	1741	1875	2009	2143	2277	2411	2545	2679	2812	2946	3080
29	1552	1681	1811	1940	2069	2198	2328	2457	2586	2716	2845	2974
30	1500	1625	1750	1875	2000	2125	2250	2375	2500	2625	2750	2875
31	1452	1573	1694	1815	1935	2057	2177	2298	2419	2540	2661	2782
32	1406	1523	1641	1758	1875	1992	2109	2227	2344	2461	2578	2695
33	1364	1477	1591	1705	1818	1932	2045	2159	2273	2386	2500	2614
34	1323	1434	1544	1654	1765	1875	1985	2096	2206	2316	2426	2537
35	1286	1393	1500	1607	1714	1821	1929	2036	2143	2250	2357	2464
36	1250	1354	1458	1563	1667	1771	1875	1979	2083	2188	2292	2396
37	1216	1318	1419	1520	1662	1723	1824	1926	2027	2128	2230	2331
38	1184	1283	1382	1480	1579	1678	1776	1875	1974	2073	2171	2270
39	1154	1250	1346	1442	1539	1635	1731	1827	1923	2019	2115	2212
40	1125	1219	1313	1406	1500	1594	1688	1781	1875	1969	2063	2156
42	1072	1161	1250	1339	1429	1517	1607	1696	1786	1875	1964	2054
44	1023	1108	1193	1278	1364	1449	1534	1619	1705	1790	1875	1960
46	978	1060	1142	1223	1304	1386	1468	1549	1630	1712	1794	1875
48	938	1016	1094	1172	1250	1328	1406	1484	1563	1641	1719	1797
50	900	975	1050	1125	1200	1275	1350	1425	1500	1575	1650	1725

Figures in upper section, except the first column, are Horse-power; those in lower section, except the first column, are Stroke × r.p.m.

Example: Mean effective pressure = 33 lbs.; stroke (10 ins.) × r.p.m.(250) = 2500; diameter of cylinder = 8 ins.; what is the horse-power? Trace horizontally from 33, in M. E. P. column, until 2500 is reached; thence upward into upper section to the number horizontally opposite the diameter, 8; this number, 20.95, is the horse-power. For sizes beyond the range of this table use Table XII-B.

Table XII-B.—Steam Engine Capacity.

Dia.	Horse-Power Developed.											
6	10.71	11.42	12.14	12.85	13.57	14.28	14.99	15.71	16.42	17.13	17.85	18.56
6½	12.57	13.41	14.24	15.08	15.92	16.76	17.6	18.43	19.27	20.11	20.95	21.79
7	14.58	15.55	16.52	16.99	18.46	19.44	20.41	21.38	22.35	23.32	24.29	25.27
7½	16.73	17.85	18.96	20.08	21.19	22.31	23.43	24.54	25.65	26.77	27.87	29.
8	19.04	20.31	21.58	22.85	24.12	25.37	26.65	27.92	29.2	30.45	31.72	33.
9	24.07	25.7	27.3	28.9	30.52	32.12	33.72	35.35	36.95	38.55	40.15	41.75
10	29.75	31.73	33.72	35.7	37.68	39.67	41.65	43.63	45.62	47.6	49.58	51.57
11	36.	38.4	40.8	43.2	45.6	48.	50.4	52.8	55.2	57.6	60.	62.4
12	42.84	45.69	48.55	51.4	54.27	57.12	59.98	62.83	65.69	68.54	71.4	74.25
13	50.28	53.63	56.98	60.34	63.69	67.04	70.39	73.74	77.09	80.44	83.8	87.15
14	58.33	62.2	66.08	69.97	73.86	77.75	81.64	85.52	89.41	93.29	97.18	101.1
15	66.94	71.4	75.86	80.32	84.78	89.25	93.71	98.17	102.6	107.1	111.5	116.
16	76.16	81.24	86.31	91.39	96.47	101.5	106.6	111.7	116.8	121.8	126.9	132.
18	96.29	102.8	109.2	115.6	122.1	128.5	134.9	141.4	147.8	154.2	160.6	167.
20	119.	126.9	134.8	142.8	150.7	158.6	166.6	174.5	182.5	190.4	198.3	206.3
22	144.	153.6	163.2	172.8	182.4	192.	201.6	211.2	220.8	230.4	240.	249.6
24	166.3	177.4	188.5	199.6	210.7	221.8	232.9	244.	255.1	266.2	277.2	288.3
26	201.1	214.5	227.9	241.3	254.7	268.1	281.5	294.9	308.3	321.7	335.2	348.6
28	233.2	248.8	264.3	279.8	295.4	311.	326.5	342.1	357.6	373.2	388.7	404.3
30	267.7	285.6	303.4	321.3	339.1	357.	374.8	392.7	410.5	428.4	446.2	464.1
32	304.6	324.9	345.2	365.5	385.9	406.2	426.5	446.8	467.1	487.4	507.7	528.
34	343.9	366.8	389.7	412.7	435.6	458.5	481.4	504.4	527.3	550.2	573.2	596.
36	385.5	411.2	436.9	462.6	488.3	514.	539.8	565.4	591.1	616.8	642.6	668.2
38	429.6	458.2	486.9	515.5	544.1	572.8	601.4	630.	658.7	687.4	716.	744.6
40	476.	507.6	539.2	571.2	602.8	634.4	666.6	698.	730.	761.6	793.2	825.2
42	524.8	559.7	594.8	629.7	664.7	699.8	734.7	769.7	804.7	839.7	874.6	909.7
44	576.	614.4	652.8	691.2	729.6	768.	806.4	844.8	883.2	921.6	960.	998.4
46	629.5	671.4	713.5	755.4	797.3	839.4	881.3	923.2	965.3	1007.	1049.	1091.
48	665.2	709.6	754.	798.4	842.8	885.2	931.6	976.	1020.	1065.	1109.	1153.

M. E. P.	Stroke in Inches Multiplied by Revolutions per Minute.											
25	3000	3200	3400	3600	3800	4000	4200	4400	4600	4800	5000	5200
26	2885	3077	3269	3462	3654	3847	4039	4231	4423	4615	4808	5000
27	2778	2963	3148	3333	3519	3704	3889	4074	4259	4445	4630	4815
28	2679	2857	3036	3214	3393	3572	3750	3929	4107	4286	4464	4643
29	2586	2759	2931	3104	3276	3448	3621	3793	3966	4138	4311	4483
30	2500	2667	2833	3000	3167	3333	3500	3667	3833	4000	4167	4334
31	2419	2581	2742	2903	3065	3226	3387	3548	3710	3871	4032	4193
32	2344	2500	2656	2813	2969	3125	3281	3438	3594	3750	3907	4063
33	2273	2424	2576	2727	2879	3030	3182	3333	3485	3636	3788	3939
34	2206	2353	2500	2647	2794	2941	3088	3235	3382	3530	3677	3824
35	2143	2286	2429	2571	2714	2857	3000	3143	3286	3429	3572	3714
36	2084	2222	2361	2500	2639	2778	2917	3056	3195	3334	3472	3611
37	2027	2162	2297	2432	2568	2703	2838	2973	3108	3243	3378	3514
38	1974	2105	2237	2369	2500	2632	2763	2895	3026	3158	3290	3421
39	1923	2051	2180	2308	2436	2564	2692	2820	2949	3077	3205	3333
40	1875	2000	2125	2250	2375	2500	2625	2750	2875	3000	3125	3250
42	1786	1905	2024	2143	2262	2381	2500	2619	2738	2857	2976	3095
44	1705	1818	1932	2046	2159	2273	2386	2500	2614	2727	2841	2955
46	1631	1739	1848	1957	2065	2174	2283	2391	2500	2609	2718	2826
48	1563	1667	1771	1875	1979	2083	2188	2292	2396	2500	2604	2708
50	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600

Figures in upper sections, except first column, are Horse-power; those in lower section, except first column, are Stroke × r.p.m.

Example: Mean effective pressure = 36; Stroke = 18 ins.; R.p.m. = 200; Diameter = 16 ins. What is the horse-power? Stroke × r.p.m. = 3600; find the number nearest this horizontally in line with the M. E. P. of 36; it is 3611. Trace upward until the number opposite the cylinder diameter (16) is reached; this number (132) is the horse-power.

For sizes beyond range of table, take one-half of any factor, except diameter, and multiply the result by 2; for large diameters, take one-half the actual diameter and multiply result by 4.

Table XIII.—Engine and Generator Ratios.

The figures in the body of the table are ratios of indicated horse-power in engine cylinder to output in kilowatts at the generator terminals.

Generator Efficiency.	Engine Efficiency.														
	75	76	77	78	79	80	81	82	83	84	85	86	87	88	90
75	2.38	2.35	2.32	2.29	2.26	2.23	2.21	2.18	2.15	2.13	2.10	2.08	2.05	2.03	1.99
76	2.35	2.32	2.29	2.26	2.23	2.20	2.18	2.15	2.12	2.10	2.07	2.05	2.03	2.	1.96
77	2.32	2.29	2.26	2.23	2.2	2.18	2.15	2.12	2.1	2.07	2.05	2.02	2.	1.98	1.94
78	2.29	2.26	2.23	2.2	2.17	2.15	2.12	2.1	2.07	2.05	2.02	2.	1.97	1.95	1.91
79	2.26	2.23	2.2	2.18	2.15	2.12	2.09	2.07	2.04	2.02	2.	1.97	1.95	1.93	1.89
80	2.23	2.2	2.18	2.15	2.12	2.09	2.07	2.04	2.02	1.99	1.97	1.95	1.93	1.9	1.86
81	2.21	2.18	2.15	2.12	2.1	2.07	2.04	2.02	2.	1.97	1.95	1.93	1.9	1.86	1.84
82	2.18	2.15	2.12	2.1	2.07	2.04	2.02	1.99	1.97	1.95	1.92	1.9	1.88	1.86	1.82
83	2.15	2.13	2.1	2.07	2.05	2.02	2.	1.97	1.95	1.92	1.9	1.88	1.86	1.84	1.8
84	2.13	2.1	2.07	2.05	2.02	2.	1.97	1.95	1.92	1.9	1.88	1.86	1.84	1.81	1.78
85	2.1	2.08	2.05	2.02	2.	1.97	1.95	1.92	1.9	1.88	1.86	1.84	1.81	1.79	1.75
86	2.08	2.05	2.03	2.	1.97	1.95	1.93	1.9	1.88	1.86	1.84	1.81	1.79	1.77	1.73
87	2.06	2.03	2.	1.98	1.95	1.93	1.9	1.88	1.86	1.84	1.81	1.79	1.77	1.75	1.71
88	2.03	2.01	1.98	1.96	1.93	1.91	1.88	1.86	1.84	1.81	1.79	1.77	1.75	1.73	1.69
89	2.01	1.98	1.96	1.93	1.91	1.88	1.86	1.84	1.82	1.79	1.77	1.75	1.73	1.71	1.68
90	1.99	1.96	1.94	1.91	1.89	1.86	1.84	1.82	1.8	1.77	1.75	1.73	1.71	1.69	1.66
91	1.97	1.94	1.92	1.89	1.87	1.84	1.82	1.8	1.78	1.76	1.74	1.72	1.7	1.68	1.64
92	1.95	1.92	1.89	1.87	1.85	1.82	1.8	1.78	1.76	1.74	1.72	1.7	1.68	1.66	1.62
93	1.92	1.9	1.87	1.85	1.83	1.8	1.78	1.76	1.74	1.72	1.7	1.68	1.66	1.64	1.6
94	1.9	1.88	1.85	1.83	1.81	1.78	1.76	1.74	1.72	1.7	1.68	1.66	1.64	1.62	1.59
95	1.88	1.86	1.83	1.81	1.79	1.77	1.74	1.72	1.7	1.68	1.66	1.64	1.62	1.6	1.57
96	1.86	1.84	1.82	1.79	1.77	1.75	1.73	1.7	1.68	1.66	1.64	1.63	1.61	1.59	1.55

Table XIV.—Boiler Output.

Required Hourly Evaporation per Commercial Horse-Power at Various Temperatures of Feed and Pressures of Steam.

Temp. of feedwater.	Steam Pressure in Pounds by Gauge.														Temp. of feedwater.
	80	90	100	110	120	130	140	150	160	170	180	190	200		
60	28.89	28.84	28.79	28.74	28.69	28.65	28.61	28.57	28.54	28.51	28.48	28.45	28.42		60
70	29.15	29.09	29.04	28.99	28.94	28.90	28.86	28.82	28.78	28.75	28.72	28.69	28.66		70
80	29.40	29.34	29.29	29.24	29.19	29.15	29.11	29.07	29.03	29.00	28.97	28.94	28.91		80
90	29.67	29.61	29.55	29.50	29.45	29.41	29.37	29.33	29.29	29.25	29.22	29.19	29.16		90
100	29.93	29.87	29.82	29.77	29.72	29.67	29.63	29.59	29.55	29.51	29.48	29.45	29.42		100
110	30.20	30.14	30.09	30.04	29.99	29.94	29.90	29.86	29.82	29.78	29.74	29.71	29.68		110
120	30.48	30.42	30.36	30.31	30.26	30.21	30.17	30.13	30.09	30.05	30.01	29.98	29.95		120
130	30.76	30.70	30.65	30.59	30.54	30.50	30.45	30.41	30.37	30.33	30.29	30.25	30.22		130
140	31.05	30.99	30.93	30.88	30.83	30.78	30.73	30.69	30.65	30.61	30.57	30.53	30.50		140
150	31.35	31.28	31.22	31.17	31.12	31.07	31.02	30.97	30.93	30.89	30.85	30.81	30.78		150
160	31.65	31.58	31.52	31.46	31.41	31.36	31.31	31.27	31.23	31.19	31.15	31.11	31.08		160
170	31.96	31.89	31.83	31.77	31.71	31.66	31.61	31.56	31.52	31.48	31.44	31.40	31.37		170
180	32.27	32.20	32.14	32.08	32.02	31.97	31.92	31.87	31.83	31.79	31.75	31.71	31.67		180
190	32.59	32.52	32.45	32.39	32.33	32.28	32.23	32.18	32.14	32.10	32.06	32.02	31.98		190
200	32.91	32.84	32.77	32.71	32.65	32.60	32.55	32.50	32.45	32.41	32.37	32.33	32.29		200
212	33.31	33.24	33.17	33.11	33.05	32.99	32.94	32.89	32.84	32.80	32.76	32.72	32.68		212

The above table is based on the standard rating of 30 lbs. of water per horse-power hour, evaporated from feed water at 100° F. into steam at 70 lbs. gauge pressure, which was recommended by the Committee of the American Society of Mechanical Engineers. The figures in the body of the table give the number of pounds of water which must be evaporated per horse-power hour at other temperatures and pressures in order to conform to this method of rating.

Table XV.—Belt Horse-Power.

Horse-Power of a Double Leather Belt Per Inch of Width.

Computed by A. F. Nagle's Formula.

Velocity in ft. per sec.	Thickness in Parts of an Inch. 1/3	3/8	7/16	1/2
15	2.58	2.91	3.39	3.87
20	3.42	3.85	4.49	5.13
25	4.25	4.78	5.57	6.37
30	5.05	5.67	6.62	7.58
35	5.83	6.56	7.65	8.75
40	6.60	7.42	8.66	9.90
45	7.32	8.43	9.70	10.98
50	8.02	9.02	10.52	12.03
55	8.66	9.74	11.36	13.00
60	9.28	10.43	12.17	13.91
65	9.83	11.06	12.90	14.75
70	10.33	11.62	13.56	15.50
75	10.84	12.16	14.18	16.21
80	11.21	12.61	14.71	16.81
85	11.55	13.00	15.16	17.32
90	11.80	13.27	15.48	17.69
100	12.13	13.65	15.92	18.20

The H.P. becomes a maximum at 105.4 ft. per sec. = 6324 ft. per min.

In the above table the arc of contact is taken at 180°.

For an arc of.....	90°	100°	110°	120°	130°	140°	150°	160°	170°	180°	200°
Multiply above values by.....	.65	.70	.75	.79	.83	.87	.91	.94	.97	1	1.05

Table XVI.—Belt and Pulley Speeds.

Pulley Revolutions per Minute Corresponding to Various Belt Speeds.

Pulley Diameter.	Belt Speed in Feet per Second. 20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
3	1528	1910	2292	2674	3056	3438	3820	....	....	....	....	....	....	....	....	....	....
3½	1310	1637	1965	2292	2619	2947	3274	3602	3929	4256	....	....	....	....	....	....	....
4	1146	1432	1719	2005	2292	2578	2865	3151	3438	3724	4011	....	....	....	....	....	....
4½	1019	1273	1528	1783	2037	2292	2547	2801	3056	3311	3565	3820	4075	....	....	....	....
5	917	1146	1375	1604	1833	2063	2292	2521	2750	2979	3209	3438	3667	3896	....	....	....
5½	833	1042	1250	1458	1667	1875	2084	2292	2500	2709	2917	3125	3334	3542	3750	3959	....
6	764	955	1146	1337	1528	1719	1910	2101	2292	2483	2674	2865	3056	3247	3438	3629	3820
6½	705	882	1058	1234	1410	1587	1763	1939	2116	2292	2468	2645	2821	2997	3173	3350	3526
7	655	818	982	1146	1310	1473	1637	1801	1965	2128	2292	2456	2619	2783	2947	3110	3274
7½	611	764	917	1070	1222	1375	1528	1681	1833	1986	2139	2292	2445	2597	2750	2903	3056
8	573	716	859	1003	1146	1289	1432	1576	1719	1862	2005	2149	2292	2435	2578	2721	2865
8½	539	674	809	944	1079	1213	1348	1483	1618	1753	1888	2022	2157	2292	2427	2561	2696
9	509	637	764	891	1019	1146	1273	1401	1528	1655	1783	1910	2037	2165	2292	2419	2526
10	...	573	688	802	917	1031	1146	1260	1375	1490	1604	1719	1833	1948	2063	2177	2292
11	...	521	625	729	833	938	1042	1146	1250	1354	1459	1563	1667	1771	1875	1979	2083
12	...	477	573	668	764	859	955	1050	1146	1241	1337	1432	1528	1623	1719	1814	1910
13	...	...	529	617	705	793	881	970	1058	1146	1234	1322	1410	1498	1587	1675	1763
14	...	...	491	573	655	737	818	900	982	1064	1146	1228	1310	1391	1473	1555	1637
15	...	...	...	535	611	687	764	840	917	993	1070	1146	1222	1299	1375	1451	1528
16	...	...	...	501	573	644	716	788	859	931	1003	1074	1146	1218	1289	1361	1432
17	...	...	...	472	539	607	674	741	809	876	944	1011	1078	1146	1213	1281	1348
18	...	...	...	...	509	573	637	700	764	828	891	955	1019	1082	1146	1210	1273
20	...	...	...	...	458	516	573	630	687	745	802	859	917	974	1031	1089	1146
21	...	...	...	...	437	491	546	600	655	709	764	818	873	928	982	1037	1091
22	...	...	...	...	416	469	521	573	625	677	729	781	833	885	937	989	1042
23	...	...	...	...	398	448	498	548	598	648	697	747	797	847	897	947	996
24	...	...	...	...	382	430	477	525	573	621	668	716	764	812	859	907	955
25	...	...	...	...	...	412	458	504	550	596	642	687	733	779	825	871	917
26	...	...	...	...	...	...	440	485	529	573	617	661	705	749	793	837	881
27	...	...	...	...	...	...	424	467	509	552	594	637	679	721	764	806	849
28	...	...	...	...	...	...	409	450	491	532	573	614	655	696	737	777	818
30	...	...	...	...	...	...	382	420	458	496	535	573	611	649	687	726	764
32	...	...	...	...	...	...	358	394	430	465	501	537	573	609	644	680	716
34	...	...	...	...	...	...	337	371	404	438	472	505	539	573	607	640	674
36	...	...	...	...	...	...	318	350	382	414	445	477	509	541	573	605	637

Table XVII.—Pump Capacity.

Showing Theoretical Capacity per Stroke, in Gallons, of Pump Cylinders of Various Strokes and Diameters.

Dia. of Cyl., Ins.	Stroke in Inches.																
	2	3	4	5	6	7	8	9	10	12	14	15	16	18	20	22	24
1¼	.0106	.0159	.0212	.0266	.0319	.0372	.0425	.0478	.0531	.0637	.0743	.0797	.0848	.0955	.1062	.1168	.1274
1⅜	.0128	.0192	.0256	.0321	.0385	.0419	.0513	.0578	.0642	.077	.089	.0963	.1027	.1156	.1280	.1408	.1541
1½	.0153	.0229	.0306	.0382	.0459	.0535	.0612	.0688	.0765	.0918	.1071	.1147	.1224	.1377	.1530	.1683	.1836
1¾	.0208	.0312	.0416	.0521	.0625	.0729	.0833	.0937	.1041	.1249	.1457	.1562	.1666	.1874	.2082	.2290	.2499
2	.0272	.0408	.0544	.068	.0816	.0952	.1088	.1224	.136	.1632	.1904	.204	.2176	.2448	.2720	.2992	.3264
2¼	.0344	.0516	.0688	.086	.1033	.1205	.1377	.1548	.1721	.2063	.241	.258	.2754	.3096	.344	.3784	.4128
2½	.0425	.0637	.0850	.1062	.1275	.1487	.17	.1912	.2125	.255	.2975	.3187	.34	.3825	.4252	.4677	.51
2¾	.0514	.0771	.1028	.1285	.1543	.1799	.2057	.2313	.2571	.3085	.3598	.3855	.4114	.4626	.5142	.5656	.617
3	.0612	.0918	.1224	.1530	.1836	.2142	.2448	.2754	.306	.3672	.4284	.459	.4896	.5508	.612	.6732	.7344
3¼	.0718	1.077	.1436	.1795	.2154	.2513	.2872	.3231	.3594	.4312	.503	.5385	.5748	.6466	.7182	.79	.8624
3½	.0833	.1249	.1666	.2082	.2499	.2915	.3332	.3748	.4165	.4998	.5831	.6247	.6664	.7497	.833	.9163	.9996
3¾	.0956	.1434	.1912	.239	.2868	.3346	.3824	.4302	.478	.5736	.6692	.687	.7648	.8605	.9561	1.0517	1.147
4	.1088	.1632	.2176	.272	.3264	.3808	.4352	.4896	.544	.6528	.7616	.816	.8904	.9792	1.088	1.1968	1.3056
4¼	.1228	.1842	.2456	.307	.3684	.4298	.4912	.5526	.6141	.7368	.8596	.921	.9824	1.105	1.228	1.3508	1.473
4½	.1377	.2065	.2754	.3442	.4131	.4819	.5508	.6196	.6885	.8262	.9639	1.0327	1.1016	1.2393	1.377	1.5147	1.6524
4¾	.1534	.2301	.3068	.3835	.4602	.5369	.6136	.6903	.7671	.9204	1.073	1.15	1.227	1.380	1.534	1.6874	1.84
5	.17	.2550	.34	.425	.51	.595	.68	.765	.85	1.02	1.19	1.275	1.36	1.53	1.7	1.87	2.04
5¼	.1874	.2811	.3718	.4685	.5622	.6559	.7496	.8433	.9371	1.124	1.311	1.405	1.499	1.686	1.874	2.0614	2.248
5½	.2057	.3085	.4114	.5142	.6171	.7199	.8228	.9256	1.0285	1.2342	1.4399	1.5427	1.6456	1.8513	2.057	2.2627	2.4684
5¾	.2248	.3372	.4496	.562	.6744	.7868	.8992	1.011	1.124	1.348	1.573	1.686	1.789	2.022	2.248	2.4728	2.696
6	.2448	.3672	.4896	.612	.7344	.8568	.9792	1.1016	1.2240	1.4688	1.7136	1.8362	1.9584	2.2032	2.448	2.6928	2.9376
6¼	.2656	.3984	.5312	.6640	.7968	.9296	1.062	1.195	1.328	1.593	1.859	1.992	2.124	2.39	2.656	2.9216	3.186
6½	.2872	.4308	.5744	.7182	.8610	1.0052	1.1488	1.2926	1.4364	1.7955	2.0109	2.1546	2.2982	2.5885	2.8728	3.16	3.4473
7	.3332	.4998	.6664	.833	.9996	1.1662	1.3328	1.4994	1.666	1.9992	2.3324	2.449	2.6656	2.9988	3.332	3.6652	3.9984
8	.4352	.6528	.8704	1.088	1.3056	1.5232	1.7408	1.9584	2.176	2.6112	3.0464	3.264	3.4816	3.9168	4.352	4.7872	5.2224
9	.5508	.8262	1.1010	1.377	1.6524	1.9278	2.2032	2.4786	2.754	3.3048	3.8556	4.131	4.4064	5.0572	5.508	6.0588	6.6096
10	.68	1.02	1.36	1.7	2.04	2.38	2.72	3.06	3.4	4.08	4.76	5.1	5.44	6.12	6.8	7.48	8.16
11	.8227	1.2341	1.6451	2.057	2.464	2.879	3.2911	3.7258	4.1139	4.9367	5.7595	6.1709	6.5823	7.4051	8.2279	9.0506	9.8735
12	.9792	1.468	1.9584	2.448	2.9376	3.4222	3.9168	4.4064	4.896	5.8752	6.8544	7.344	7.833	8.8128	9.792	10.7712	11.7504
13	1.149	1.723	2.297	2.872	3.445	4.022	4.596	5.170	5.745	6.894	8.042	8.616	9.192	10.34	11.49	12.639	13.78
14	1.332	1.998	2.665	3.331	3.997	4.664	5.33	5.996	6.663	7.994	9.328	9.993	10.66	11.99	13.32	14.652	15.98
15	1.529	2.294	3.059	3.824	4.589	5.354	6.119	6.884	7.649	9.178	10.70	11.47	12.23	13.76	15.29	16.819	18.35
16	1.74	2.61	3.48	4.35	5.22	6.09	6.96	7.83	8.703	10.44	12.18	13.05	13.92	15.66	17.40	19.14	20.88
18	2.202	3.303	4.404	5.505	6.606	7.707	8.808	9.909	11.01	13.21	15.41	16.51	17.61	19.81	22.02	24.22	26.42
20	2.720	4.08	5.440	6.8	8.16	9.52	10.88	12.24	13.6	16.32	19.04	20.4	21.76	24.48	27.2	29.92	32.6

The actual capacity will be somewhat less than the figures in the table on account of the "slip" of the pump.

Table XVIII.

Theoretical Horse-Power Required to Raise Water to Different Heights.

The Figures at Top of Columns are Height in Feet.

Gals. per min.	5	10	15	20	25	30	35	40	45	50	60	75	Gals. per min.
5	.006	.012	.019	.025	.031	.037	.044	.05	.06	.06	.07	.09	5
10	.012	.025	.037	.050	.062	.075	.087	.10	.11	.12	.15	.19	10
15	.019	.037	.056	.075	.094	.112	.131	.15	.17	.19	.22	.28	15
20	.025	.050	.075	.100	.125	.150	.175	.20	.22	.25	.30	.37	20
25	.031	.062	.093	.125	.156	.187	.219	.25	.28	.31	.37	.47	25
30	.037	.075	.112	.150	.187	.225	.262	.30	.34	.37	.45	.56	30
35	.043	.087	.131	.175	.219	.262	.306	.35	.39	.44	.52	.66	35
40	.050	.100	.150	.200	.250	.300	.350	.40	.45	.50	.60	.75	40
45	.056	.112	.168	.225	.281	.337	.394	.45	.51	.56	.67	.84	45
50	.062	.125	.187	.250	.312	.375	.437	.50	.56	.62	.75	.94	50
60	.075	.150	.225	.300	.375	.450	.525	.60	.67	.75	.90	1.12	60
75	.095	.187	.281	.375	.469	.562	.656	.75	.84	.94	1.12	1.40	75
90	.112	.225	.337	.450	.562	.675	.787	.90	1.01	1.12	1.35	1.68	90
100	.125	.250	.375	.500	.625	.750	.875	1.00	1.12	1.25	1.50	1.87	100
125	.156	.312	.469	.625	.781	.937	1.094	1.25	1.41	1.56	1.87	2.34	125
150	.187	.375	.562	.750	.937	1.125	1.312	1.50	1.69	1.87	2.25	2.81	150
175	.219	.437	.656	.875	1.093	1.312	1.531	1.75	1.97	2.19	2.62	3.28	175
200	.250	.500	.750	1.000	1.250	1.500	1.750	2.00	2.25	2.50	3.00	3.75	200
250	.312	.625	.937	1.250	1.562	1.875	2.187	2.50	2.81	3.12	3.75	4.69	250
300	.375	.750	1.125	1.500	1.875	2.250	2.625	3.00	3.37	3.75	4.50	5.62	300
350	.437	.875	1.312	1.750	2.187	2.625	3.062	3.50	3.94	4.37	5.25	6.56	350
400	.500	1.000	1.500	2.000	2.500	3.000	3.500	4.00	4.50	5.00	6.00	7.50	400
500	.625	1.250	1.875	2.500	3.125	3.750	4.375	5.00	5.62	6.25	7.50	9.37	500

Gals. per min.	Height in Feet										Gals. per min.
	90	100	125	150	175	200	250	300	350	400	
5	.11	.12	.16	.19	.22	.25	.31	.37	.44	.50	5
10	.22	.25	.31	.37	.44	.50	.62	.75	.87	1.00	10
15	.34	.37	.47	.56	.66	.75	.94	1.12	1.31	1.50	15
20	.45	.50	.62	.75	.87	1.00	1.25	1.50	1.75	2.00	20
25	.56	.62	.78	.94	1.09	1.25	1.56	1.87	2.19	2.50	25
30	.67	.75	.94	1.12	1.31	1.50	1.87	2.25	2.62	3.00	30
35	.79	.87	1.08	1.31	1.53	1.75	2.19	2.62	3.06	3.50	35
40	.90	1.00	1.25	1.50	1.75	2.00	2.50	3.00	3.50	4.00	40
45	1.01	1.12	1.41	1.69	1.97	2.25	2.81	3.37	3.94	4.50	45
50	1.12	1.25	1.56	1.87	2.19	2.50	3.12	3.75	4.37	5.00	50
60	1.35	1.50	1.87	2.25	2.62	3.00	3.75	4.50	5.25	6.00	60
75	1.69	1.87	2.34	2.81	3.28	3.75	4.69	5.62	6.56	7.50	75
90	2.02	2.25	2.81	3.37	3.94	4.50	5.62	6.75	7.87	9.00	90
100	2.25	2.50	3.12	3.75	4.37	5.00	6.25	7.50	8.75	10.00	100
125	2.81	3.12	3.91	4.69	5.47	6.25	7.81	9.37	10.94	12.50	125
150	3.37	3.75	4.69	5.62	6.56	7.50	9.37	11.25	13.12	15.00	150
175	3.94	4.37	5.47	6.56	7.66	8.75	10.94	13.12	15.31	17.50	175
200	4.50	5.00	6.25	7.50	8.75	10.00	12.50	15.00	17.50	20.00	200
250	5.62	6.25	7.81	9.37	10.94	12.50	15.72	18.75	21.87	25.00	250
300	6.75	7.50	9.37	11.25	13.12	15.00	18.75	22.50	26.25	30.00	300
350	7.87	8.75	10.94	13.12	15.31	17.50	21.87	26.25	30.62	35.00	350
400	9.00	10.00	12.50	15.00	17.50	20.00	25.00	30.00	35.00	40.00	400
500	11.25	12.50	15.62	18.75	21.87	25.00	31.25	37.50	43.75	50.00	500

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